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P. O. BOX 980
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UNITED STATES DESIGNATED/ELECTED
OFFICE (DO/EO/US)
NOTIFICATION OF ACCEPTANCE OF
APPLICATION UNDER 35 U.S.C. 371
AND 37 CFR 1.494 OR 1.495

Date of Mailing

16 AUG 1993

File Reference

MUR-3490

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International application Number

PCT/GB91/01599

International filing date

18 SEPTEMBER 1991

Priority date claimed

29 SEPTEMBER 1990

Applicant for DO/EO/US

SMITH, DAVID BALFOUR

NOTIFICATION

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a ☐ Designated Office, ☒ Elected Office, has determined that the above identified international application has met the requirements of 35 U.S.C. 371 and 37 CFR ☐ 1.494, ☒ 1.495 and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Serial Number assigned to the application and the relevant dates are:

08/030,309 07 MAY 1993 07 MAY 1993
U.S. NATIONAL SERIAL NO. 35 U.S.C. 102(e) DATE DATE OF RECEIPT 35 U.S.C.
371 REQUIREMENTS

- ☒ A request for immediate examination under 35 U.S.C. 371 (f) was received on 29 MAR 1993 and the application will be examined in turn.
- ☐ No request for immediate examination under 35 U.S.C. 371(f) was received. The application will not be processed or examined before the time limit set forth in either
- ☐ PCT Article 23 (Chapter I of the PCT), or ☐ PCT Article 40 (Chapter II of the PCT) whichever is applicable.

UNITED STATES DESIGNATED/ELECTED OFFICE

ADDRESS ONLY:
COMMISSIONER OF PATENTS AND TRADEMARKS
Box PCT, Attn. DO/EO/US
Washington, D.C. 20231

AUTHORIZED OFFICER

Anita Johnson

PATENT COOPERATION TREATY

TO

Murgitroyd and Company
Chartered Patent Agents
Mitchell House
333 Bath Street
GLASGOW
G2 4ER

FROM THE INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY
identified at the bottom of this page

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT
Issued pursuant to PCT Rule 71.1

Indicate name and address of the agent and if there is no agent, of the applicant

DATE OF MAILING by the International Preliminary Examining Authority 22 JUN 1992

APPLICANT'S OR AGENT'S FILE REFERENCE P 36197/2A/INT/SC

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International Application No.

PCT/GB 91/01599

International Filing Date

18 September 1991 (18.09.91)

Applicant (Name)

METROL TECHNOLOGY LIMITED ET AL

NOTIFICATION

The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the above-identified international application.

The attention of the applicant is drawn to the reminder contained in Form PCT/IB/332, which he received from the International Bureau, concerning the time limits within which he must perform certain acts before each elected Office.

A copy of the report and its annexes, if any, has this same day also been transmitted to the International Bureau

THE INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

Name and Address

**THE PATENT OFFICE
CARDIFF RD., NEWPORT
GWENT NP23 1RH**

Authorized Officer

J BETTS GR78 Concept 0633 814608

PATENT COOPERATION TREATY

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or Agent's File Reference P 36 98 / SM / NP / SC		
International Application No. PCT/GB91/01599	International Filing Date 18 September 1991 (18.09.91)			
Receiving Office UK PATENT OFFICE	Priority Date Claimed 29 September 1990 (29.09.90)			
Applicant (Name) METROL TECHNOLOGY LIMITED ET AL				
BASIS OF REPORT				
<p>1. AMENDMENTS AND/OR RECTIFICATIONS¹ — The amendments and/or rectifications made before this International Preliminary Examining Authority in respect of the claims, the description, and/or drawings in the above-identified international application are annexed to this report.</p> <p>a. <input checked="" type="checkbox"/> This report has been established on the basis of the following application documents:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> the application documents as filed <input checked="" type="checkbox"/> description, pages 1-7 description, pages description, pages description, pages <input checked="" type="checkbox"/> claim(s) 1-13 claim(s) claim(s) claim(s) <input checked="" type="checkbox"/> drawings, sheet/fig. 1-3 drawings, sheet/fig. </td> <td style="width: 50%; vertical-align: top;"> as originally filed filed with your letter of filed with your letter of filed with your letter of as originally filed filed with your letter of 11 June 1992 (11/06/92) filed with your letter of filed with your letter of as originally filed filed with your letter of Pages 8-11 </td> </tr> </table> <p>b. <input checked="" type="checkbox"/> The amendments resulted in the cancellation of the following sheets:</p> <p>c. <input type="checkbox"/> This report has been established as if the amendments indicated on the extra sheet have not been made, since, for the reasons indicated, they have been considered to go beyond the disclosure as filed.</p>			<input type="checkbox"/> the application documents as filed <input checked="" type="checkbox"/> description, pages 1-7 description, pages description, pages description, pages <input checked="" type="checkbox"/> claim(s) 1-13 claim(s) claim(s) claim(s) <input checked="" type="checkbox"/> drawings, sheet/fig. 1-3 drawings, sheet/fig.	as originally filed filed with your letter of filed with your letter of filed with your letter of as originally filed filed with your letter of 11 June 1992 (11/06/92) filed with your letter of filed with your letter of as originally filed filed with your letter of Pages 8-11
<input type="checkbox"/> the application documents as filed <input checked="" type="checkbox"/> description, pages 1-7 description, pages description, pages description, pages <input checked="" type="checkbox"/> claim(s) 1-13 claim(s) claim(s) claim(s) <input checked="" type="checkbox"/> drawings, sheet/fig. 1-3 drawings, sheet/fig.	as originally filed filed with your letter of filed with your letter of filed with your letter of as originally filed filed with your letter of 11 June 1992 (11/06/92) filed with your letter of filed with your letter of as originally filed filed with your letter of Pages 8-11			
<p>2. PRIORITY²</p> <p>a. This report has been established as if no priority has been claimed due to the failure to furnish within the prescribed time limit the requested:</p> <p><input type="checkbox"/> copy of the earlier application whose priority has been claimed.</p> <p><input type="checkbox"/> translation of the earlier application whose priority has been claimed.</p> <p>b. <input type="checkbox"/> This report has been established as if no priority has been claimed due to the fact that the priority claim has been found invalid.</p> <p>Thus, for the purposes of this report, the international filing date indicated above is considered to be the relevant date.</p>				
<p><small>¹ Where replacement sheets are annexed to this report, a translation of these replacement sheets must be furnished to the elected Office within the time limit applicable under PCT Article 39(1).</small></p>				

CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all.)

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.5 E21B47/12 G08C23/00

REASONED STATEMENT AS TO CLAIMS MEETING CRITERIA OF NOVELTY (N), INVENTIVE STEP (IS)
AND INDUSTRIAL APPLICABILITY (IA) AND CITATIONS AND EXPLANATIONS
SUPPORTING SUCH STATEMENTCLAIM STATEMENT
NUMBER : (CRITERIA)

CITATIONS AND EXPLANATIONS

1-13 : Yes (N,
IS, IA)

All claims meet the requirements of industrial applicability, novelty and inventive step.

Both Claims 1 and 6 require the provision of a store to receive data transmitted along an elongate member within the borehole. None of the cited documents shows this combination.

Only GB 1096388 A shows a data store, but there seems no justification for combining this with the other cited documents which are all concerned with transmission direct to the surface along the drill string.

NON-WRITTEN DISCLOSURES *

Kind of Non-Written Disclosure	Date of Written Disclosure referring to the Non-Written Disclosure	Date of Non-Written Disclosure

CERTAIN PUBLISHED DOCUMENTS ¹⁰

Application/Patent	Date of Publication	Filing Date	Priority Date (Valid Claim)

CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION ¹¹

The following defects in the form or contents of the international application have been noted.

CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION ¹²

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description have been noted.

CERTIFICATION

Date Demand Submitted

30 March 1992 (30.03.92)

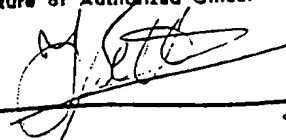
Date of Completion of the International Preliminary Examination Report

22 June 1992 (22/06/92)

International Preliminary Examining Authority

UK PATENT UNITED KINGDOM

Signature of Authorized Officer



1 CLAIMS

- 2
- 3 1. A method of transmitting data in a borehole, the
- 4 method comprising providing an electric signal
- 5 representative of the data to be transmitted,
- 6 converting said electric signal into a sonic
- 7 signal and propagating said sonic signal along an
- 8 elongate member, said data being transmitted from
- 9 one side to the other of a physical obstruction in
- 10 said elongate member, the conversion of the
- 11 electric signal into the sonic signal being
- 12 effected at a location on said one side;
- 13 characterised in that said sonic signal is
- 14 converted into an electrical signal on said other
- 15 side of said obstruction and said data is stored
- 16 on said other side for subsequent retrieval.
- 17
- 18 2. A method according to claim 1, in which the
- 19 subsequent retrieval is effected by a pick-up tool
- 20 lowered down the borehole to a location adjacent
- 21 the obstruction.
- 22
- 23 3. A method according to claim 1, in which conversion
- 24 from the electric signal to the sonic signal
- 25 includes digital modulation of a carrier frequency
- 26 in the range 100 Hz to 10 kHz.
- 27
- 28 4. A method according to claim 1, in which the sonic
- 29 transmission is effected by longitudinal
- 30 vibration.
- 31
- 32 5. A method according to claim 1, in which the
- 33 elongate member is a drill stem, the obstruction
- 34 is a shut-in valve in the drill stem, and the data

1 comprises pressure-versus-time in the drill stem
2 beneath the shut-in valve.

3
4 6. Apparatus for transmitting data in a borehole, the
5 apparatus comprising a transmitter and a receiver;
6 the transmitter including means for converting
7 data parameters into an electric signal and first
8 transducer means responsive to said electric
9 signal to generate an acoustic signal, the first
10 transducer means being adapted for physical
11 coupling to an elongate member extending along the
12 borehole whereby the acoustic signal is propagated
13 in said elongate member; the receiver comprising
14 second transducer means adapted for physical
15 coupling to said elongate member to produce an
16 electrical output corresponding to said acoustic
17 signal, and signal processing means connected to
18 receive said output and operative to process the
19 data into a condition for onward transmission;
20 characterised in that said signal processing means
21 includes memory means for storing received data,
22 and means for transferring data from the memory
23 means to a pick-up tool lowered to an adjacent
24 location in the borehole.

25
26 7. Apparatus according to claim 6 for use in
27 transmitting data from one side to the other of an
28 obstruction in said elongate member, the first
29 transducer means being coupled, in use, to the
30 elongate member at a location on said one side of
31 the obstruction, and the second transducer means
32 being coupled, in use, to the elongate member at
33 the other side of the obstruction.
34

- 1 8. Apparatus according to claim 6, in which the first
2 transducer means is a magnetostrictive transducer
3 adapted to be mounted to the elongate member to
4 produce longitudinal sonic vibrations in it.
5
- 6 9. Apparatus according to claim 7, in which the data
7 parameter converting means is a fluid pressure
8 transducer for monitoring fluid pressure below
9 said obstruction.
10
- 11 10. Apparatus according to claim 6, in which said
12 second transducer means comprises a mechanical
13 bandpass filter and a piezoactive element mounted
14 in series on the elongate member.
15
- 16 11. Apparatus according to claim 6, in which the
17 signal processing means includes electronic filter
18 means.
19
- 20 12. Apparatus according to claim 6, in which the
21 pick-up tool includes further memory means in
22 which the data may be stored until the pick-up
23 tool is returned to the surface.
24
- 25 13. Apparatus according to claim 6, in which the
26 pick-up tool includes means for transmitting the
27 data to the surface via a cable.
28
29
30
31
32
33
34

02 MAR 1952

[illegible]

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 E21B47/12; G08C23/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	E21B ; G08C	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	EP,A,0 033 192 (SPERRY CORPORATION) 5 August 1981	1,2,6-14
Y	see page 1, line 1 - page 2, line 17; claims	3-4, 15-17
Y	GB,A,1 096 388 (TEXACO DEVELOPMENT CORPORATION) 29 December 1967 see the whole document	3,4, 15-17
X	US,A,4 293 936 (COX) 6 October 1981 see claims	1,2,5,6, 9,10,18
X	WO,A,8 910 573 (ATLANTIC RICHFIELD COMPANY) 2 November 1989 see page 2, line 16 - page 3, line 22; claims 1-4,12,13	1,9
<p>¹⁰ Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
08 JANUARY 1992	17. 01. 92	
International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer REEKMANS M. V.	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9101599
SA 51504

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 08/01/92

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP-A-0033192	05-08-81	US-A-	4283780	11-08-81
		US-A-	4302826	24-11-81
		US-A-	4282588	04-08-81
		JP-A-	56125595	01-10-81

GB-A-1096388		None		

US-A-4293936	06-10-81	CA-A-	1098202	24-03-81
		DE-A,C	2758770	20-07-78
		FR-A,B	2376288	28-07-78
		GB-A-	1598340	16-09-81
		JP-C-	1394519	11-08-87
		JP-A-	53101453	04-09-78
		JP-B-	62002113	17-01-87

WO-A-8910573	02-11-89	US-A-	4992997	12-02-91
		AU-A-	3689489	24-11-89



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :

E21B 47/12, G08C 23/00

A1

(11) International Publication Number:

WO 92/062

(43) International Publication Date:

16 April 1992 (16.04.92)

(21) International Application Number:

PCT/GB91/01599

(22) International Filing Date:

18 September 1991 (18.09.91)

(30) Priority data:
9021253.1

29 September 1990 (29.09.90) GB

(71) Applicant (for all designated States except US): METROL
TECHNOLOGY LIMITED (GB/GB); 1 Whitemyres
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(72) Inventor: and

(75) Inventor/Applicant (for US only): SMITH, David, Balfour
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shire AB3 2NQ (GB).(74) Agent: PATTULLO, Norman; Murgitroyd and Company,
Mitchell House, 333 Bath Street, Glasgow G2 4ER (GB).

(81) Designated States: AT (European patent), AU, BB, BE, BF (European patent), BR, CA, CF (OAPI patent), CO (OAPI patent), CH (European patent), CI (OAPI patent), CM (OAPI patent), CS, DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GR (European patent), HU, IR (European patent), JP, KP, KR, LK, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MV, NL (European patent), NO, PL, RO, SD, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TR (OAPI patent), US.

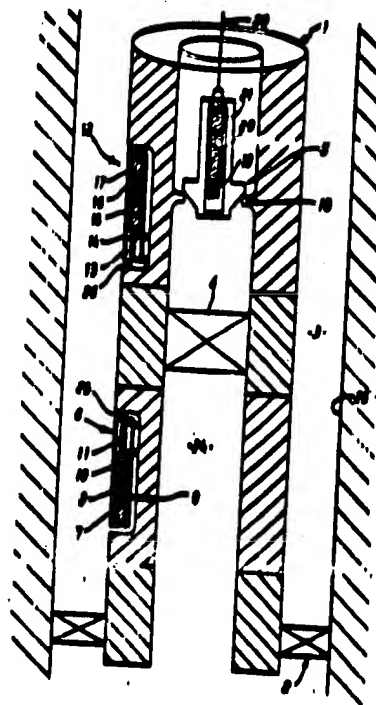
Published

With international search report.

(54) Title: TRANSMISSION OF DATA IN BOREHOLES

(57) Abstract

Data is transmitted along a borehole containing a drill stem (2) by means of a transmitter (6) which converts electric data signals into acoustic signals propagating along the drill stem (2). The acoustic signals are converted back to electric form by a receiver (12) which also processes the signals. In the preferred form the signals are stored in a receiver memory (15) for subsequent retrieval using a pick-up tool (5) lowered into the borehole. The system is particularly useful in moving data past an obstruction such as a shut-in valve (4).



I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ¹		
According to International Patent Classification (IPC) or to both National Classifications and IPC		
Int.Cl. 5 E21B47/12; G08C23/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched?		
Classification System	Classification Symbols	
Int.Cl. 5	E21B ; G08C	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ²		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ³		
Category ⁴	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	EP,A,0 033 192 (SPERRY CORPORATION) 5 August 1981	1,2,6-14
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X	US,A,4 293 936 (COX) 6 October 1981 see claims	1,2,5,6, 9,10,18
X	WO,A,8 910 573 (ATLANTIC RICHFIELD COMPANY) 2 November 1989 see page 2, line 16 - page 3, line 22; claims 1-4,12,13	1,9
<p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"T" document published prior to the international filing date but later than the priority date claimed</p> <p>"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
08 JANUARY 1992	17. 01. 92	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	REEKMANS M.V.	

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. GB 9101599
SA 51504

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0033192	05-08-81	US-A- 4283780	11-08-81
		US-A- 4302826	24-11-81
		US-A- 4282588	04-08-81
		JP-A- 56125595	01-10-81
GB-A-1096388		None	
US-A-4293936	06-10-81	CA-A- 1098202	24-03-81
		DE-A, C 2758770	20-07-78
		FR-A, B 2376288	28-07-78
		GB-A- 1598340	16-09-81
		JP-C- 1394519	11-08-87
		JP-A- 53101453	04-09-78
		JP-B- 62002113	17-01-87
WO-A-8910573	02-11-89	US-A- 4992997	12-02-91
		AU-A- 3689489	24-11-89

EPD FORM 1007

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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WORLD INTELLECTUAL PROPERTY
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CHANGE
UNDER PCT RULE 92BISIssued Pursuant to PCT Administrative
Instructions, Section 422

TO

PATTULLO, Norman
Murgitroyd and Company
Chartered Patent Agents
Mitchell House
333 Bath Street
Glasgow G2 4ER
ROYAUME-UNIDATE OF MAILING by the International Bureau
10 April 1992 (10.04.92)APPLICANT'S OR AGENT'S FILE REFERENCE
P8698/SFM/NP

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International Application No.
PCT/GB91/01599International Filing Date
18 September 1991 (18.09.91)

NOTIFICATION

The following information previously appeared on record concerning the:

☒ applicant☐ inventor☐ agent or common representative

Name

METROL TECHNOLOGY LIMITED

Address

No 1, Whitemyres Avenue
Mastrick
Aberdeen AB2 6HQ
Great BritainNationality
(country code):

GB

Residence
(country code):

Telephone number:

Telegraphic address:

Teleprinter address:

The International Bureau hereby notifies that the following change was recorded:

Change of address.

Name

Address

Unit 24
Kirkhill Place
Kirkhill Industrial Estate
Dyce
Aberdeen AB2 OGU
Great BritainNationality
(country code):Residence
(country code):

Telephone number:

Telegraphic address:

Teleprinter address:

The International Bureau has sent a copy of this notification to the:

☒ receiving Office☐ International Searching Authority☒ International Preliminary Examining Authority☒ designated Offices concerned☒ elected Offices concerned

THE INTERNATIONAL BUREAU OF THE WORLD INTELLECTUAL PROPERTY ORGANIZATION

Mailing Address

WIPO
34, chemin des Colombettes
1211 Geneva 20
Switzerland

Authorized Officer

M.C. Taylor

(27th c'd PCT/PTO 25 OCT '91

PATENT COOPERATION TREATY

INTERNATIONAL APPLICATION NO. PCT/GB91/01599	
NOTIFICATION TO THE DESIGNATED OFFICE OF RECEIPT OF RECORD COPY issued under PCT Rule 24.2(a)	To: United States Patent and Trademark Office Washington, D.C.
APPLICANT'S OR AGENT'S FILE REFERENCE: P8698/SFM/NP	in its capacity as a designated Office
DATE OF MAILING OF THIS NOTIFICATION: 10 October 1991 (10.10.91)	From: The International Bureau of WIPO 1211 Geneva 20 Switzerland
NAME(S) OF APPLICANT(S): SMITH, David, Balfour	
INTERNATIONAL FILING DATE: 18 September 1991 (18.09.91)	
PRIORITY DATE(S) CLAIMED: 29 September 1990 (29.09.90)	
DATE OF RECEIPT OF RECORD COPY BY INTERNATIONAL BUREAU: 10 October 1991 (10.10.91)	
M.C. Taylor (Authorized Officer)	

P A T E N T

22 Rec'd PCT/PT

COOPERATION

JUL 1991

T E A T Y

PCT/GB91/01599

TO:

United States Patent
and Trademark Office
Washington, D.C.

FROM:

the INTERNATIONAL BUREAU of the
WORLD INTELLECTUAL PROPERTY
ORGANIZATION

NOTIFICATION CONCERNING
DOCUMENTS TRANSMITTED

Issued pursuant to PCT
Article 36(3)(a)

(as elected Office)

Date of Mailing:

29 June 1992 (29.06.92)

NOTIFICATION

The International Bureau transmits herewith the following documents
and number thereof:

1 (number of) copy(s) of the international preliminary
examination report and annexes (Article 36(3)(a)).

This notification is sent to the above addressee in its capacity as
an elected Office.

THE INTERNATIONAL BUREAU OF THE WORLD INTELLECTUAL PROPERTY ORGANIZATION

Mailing Address:

WIPO
34, chemin des Colombettes
1211 Geneva 20
Switzerland

Authorised Officer:

M. Abidine

24

**PATENT COOPERATION TREATY
INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

REC'D 25 JUN 1992
WIPO PCT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or Agent's File Reference		
International Application No. PCT/GB91/01599	International Filing Date 18 September 1991 (18.09.91)	P 3698 / SM / NP / SC		
Receiving Office UK PATENT OFFICE	Priority Date Claimed 29 September 1990 (29.09.90)			
Applicant (Name) METROL TECHNOLOGY LIMITED ET AL				
BASIS OF REPORT				
<p>1. AMENDMENTS AND/OR RECTIFICATIONS¹ — The amendments and/or rectifications made before this International Preliminary Examining Authority in respect of the claims, the description, and/or drawings in the above-identified international application are annexed to this report.</p> <p>a. <input checked="" type="checkbox"/> This report has been established on the basis of the following application documents:</p> <table style="width: 100%; border: none;"><tr><td style="width: 50%; vertical-align: top;"><p><input type="checkbox"/> the application documents as filed</p><p><input checked="" type="checkbox"/> description, pages 1-7</p><p style="padding-left: 20px;">description, pages</p><p style="padding-left: 20px;">description, pages</p><p style="padding-left: 20px;">description, pages</p><p><input checked="" type="checkbox"/> claim(s) 1-13</p><p style="padding-left: 20px;">claim(s)</p><p style="padding-left: 20px;">claim(s)</p><p style="padding-left: 20px;">claim(s)</p><p><input checked="" type="checkbox"/> drawings, sheet/fig. 1-3</p><p style="padding-left: 20px;">drawings, sheet/fig.</p></td><td style="width: 50%; vertical-align: top;"><p>as originally filed</p><p>filed with your letter of</p><p>filed with your letter of</p><p>filed with your letter of</p><p>as originally filed</p><p>filed with your letter of 11 June 1992 (11/06/92)</p><p>filed with your letter of</p><p>filed with your letter of</p><p>as originally filed</p><p>filed with your letter of</p><p style="text-align: center;">Pages 8-11</p></td></tr></table> <p>b. <input checked="" type="checkbox"/> The amendments resulted in the cancellation of the following sheets:</p> <p>c. <input type="checkbox"/> This report has been established as if the amendments indicated on the extra sheet have not been made, since, for the reasons indicated, they have been considered to go beyond the disclosure as filed.</p> <p>2. PRIORITY²</p> <p>a. This report has been established as if no priority has been claimed due to the failure to furnish within the prescribed time limit the requested:</p> <p><input type="checkbox"/> copy of the earlier application whose priority has been claimed.</p> <p><input type="checkbox"/> translation of the earlier application whose priority has been claimed.</p> <p>b. <input type="checkbox"/> This report has been established as if no priority has been claimed due to the fact that the priority claim has been found invalid.</p> <p style="padding-top: 10px;">Thus, for the purposes of this report, the international filing date indicated above is considered to be the relevant date.</p>			<p><input type="checkbox"/> the application documents as filed</p> <p><input checked="" type="checkbox"/> description, pages 1-7</p> <p style="padding-left: 20px;">description, pages</p> <p style="padding-left: 20px;">description, pages</p> <p style="padding-left: 20px;">description, pages</p> <p><input checked="" type="checkbox"/> claim(s) 1-13</p> <p style="padding-left: 20px;">claim(s)</p> <p style="padding-left: 20px;">claim(s)</p> <p style="padding-left: 20px;">claim(s)</p> <p><input checked="" type="checkbox"/> drawings, sheet/fig. 1-3</p> <p style="padding-left: 20px;">drawings, sheet/fig.</p>	<p>as originally filed</p> <p>filed with your letter of</p> <p>filed with your letter of</p> <p>filed with your letter of</p> <p>as originally filed</p> <p>filed with your letter of 11 June 1992 (11/06/92)</p> <p>filed with your letter of</p> <p>filed with your letter of</p> <p>as originally filed</p> <p>filed with your letter of</p> <p style="text-align: center;">Pages 8-11</p>
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<p><small>¹ Where replacement sheets are annexed to this report, a translation of these replacement sheets must be furnished to the elected Offices within the time limit applicable under PCT Article 39(1).</small></p>				

CLASSIFICATION F SUBJECT MATTER (If several classification symbols apply, indicate all.) ¹		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl.5 E21B47/12 G08C23/00		
REASONED STATEMENT AS TO CLAIMS MEETING CRITERIA OF NOVELTY (N), INVENTIVE STEP (IS) AND INDUSTRIAL APPLICABILITY (IA) ⁴ AND CITATIONS ⁷ AND EXPLANATIONS ⁸ SUPPORTING SUCH STATEMENT		
CLAIM NUMBER	STATEMENT (CRITERIA)	CITATIONS AND EXPLANATIONS
1-13	Yes (N, IS, IA)	<p>All claims meet the requirements of industrial applicability, novelty and inventive step.</p> <p>Both Claims 1 and 6 require the provision of a store to receive data transmitted along an elongate member within the borehole. None of the cited documents shows this combination.</p> <p>Only GB 1096388 A shows a data store, but there seems no justification for combining this with the other cited documents which are all concerned with transmission directly to the surface along the drill string.</p>

N N-WRITTEN DISCLOSURES ⁹			
Kind of Non-Written Disclosure	Date of Written Disclosure referring to the Non-Written Disclosure	Date of Non-Written Disclosure	


CERTAIN PUBLISHED DOCUMENTS ¹⁰			
Application/Patent	Date of Publication	Filing Date	Priority Date (Valid Claim)

CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION ¹¹

The following defects in the form or contents of the international application have been noted.

CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION ¹²

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description have been noted.

CERTIFICATE	
<p>Date Demand Submitted</p> <p>30 March 1992 (30.03.92)</p>	<p>Date of Completion of the International Preliminary Examination Report</p> <p>22 June 1992 (22/06/92)</p>
<p>International Preliminary Examining Authority</p> <p>UK PATENT UNITED KINGDOM</p>	<p>Signature of Authorized Officer</p> 

1 **CLAIMS**

2

3 1. A method of transmitting data in a borehole, the
4 method comprising providing an electric signal
5 representative of the data to be transmitted,
6 converting said electric signal into a sonic
7 signal, propagating said sonic signal along an
8 elongate member, and processing the sonic signal
9 for onward transmission.

10

11 2. A method according to claim 1, in which data is
12 transmitted from one side to the other of a
13 physical obstruction in said elongate member, the
14 conversion of the electric signal into the sonic
15 signal being effected at a location on said one
16 side, and the processing being effected at said
17 other side.

18

19 3. A method according to claim 1 or claim 2, in which
20 said processing comprises storing the data for
21 subsequent retrieval.

22

23 4. A method according to claim 3, in which the
24 subsequent retrieval is effected by a pick-up tool
25 lowered down the borehole to a location adjacent
26 the obstruction.

27

28 5. A method according to claim 1 or claim 2, in which
29 said processing comprises sonic re-transmission.

30

31 6. A method according to any one of the preceding
32 claims, in which conversion from the electric
33 signal to the sonic signal includes digital
34 modulation or a carrier frequency in the range 100
35 Hz to 10 kHz.

Replaced by Article 34

- 1 7. A method according to any one of the preceding
2 claims, in which the sonic transmission is
3 effected by longitudinal vibration.
4
- 5 8. A method according to claim 2, in which the
6 elongate member is a drill stem, the obstruction
7 is a shut-in valve in the drill stem, and the data
8 comprises pressure-versus-time in the drill stem
9 beneath the shut-in valve.
10
- 11 9. Apparatus for transmitting data in a borehole, the
12 apparatus comprising a transmitter and a receiver;
13 the transmitter including means for converting
14 data parameters into an electric signal and first
15 transducer means responsive to said electric
16 signal to generate an acoustic signal, the first
17 transducer means being adapted for physical
18 coupling to an elongate member extending along the
19 borehole whereby the acoustic signal is propagated
20 in said elongate member; the receiver comprising
21 second transducer means adapted for physical
22 coupling to said elongate member to produce an
23 electrical output corresponding to said acoustic
24 signal, and signal processing means connected to
25 receive said output and operative to process the
26 data into a condition for onward transmission.
27
- 28 10. Apparatus according to claim 9 for use in
29 transmitting data from one side to the other of an
30 obstruction in said elongate member, the first
31 transducer means being coupled, in use, to the
32 elongate member at a location on said one side of
33 the obstruction, and the second transducer means
34 being coupled, in use, to the elongate member at
35 the other side of the obstruction.

Replaced by Article 34

- 1 11. Apparatus according to claim 9 or claim 10, in
2 which the first transducer means is a
3 magnetostrictive transducer adapted to be mounted
4 to the elongate member to produce longitudinal
5 sonic vibrations in it.
6
- 7 12. Apparatus according to claim 10, in which the data
8 parameter converting means is a fluid pressure
9 transducer for monitoring fluid pressure below
10 said obstruction.
11
- 12 13. Apparatus according to any of claims 9 to 12, in
13 which said second transducer means comprises a
14 mechanical bandpass filter and a piezoactive
15 element mounted in series on the elongate member.
16
- 17 14. Apparatus according to any of claims 9 to 13, in
18 which the signal processing means includes
19 electronic filter means.
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- 21 15. Apparatus according to any of claims 9 to 14, in
22 which the signal processing means includes a
23 memory for storing received data, and means for
24 transferring data from the memory to a pick-up
25 tool lowered to an adjacent location in the
26 borehole.
27
- 28 16. Apparatus according to claim 15, in which the
29 pick-up tool includes a further memory in which
30 the data may be stored until the pick-up tool is
31 returned to the surface.
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- 33 17. Apparatus according to claim 15, in which the
34 pick-up tool includes means for transmitting the
35 data to the surface via a cable.

Replaced by Article 34

- 1 18. Apparatus according to any of claims 9 to 14, in
2 which the signal processing means includes a
3 further electroacoustic transducer for
4 retransmitting the data as an acoustic signal
5 along the elongate member.
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Replaced by Article 34